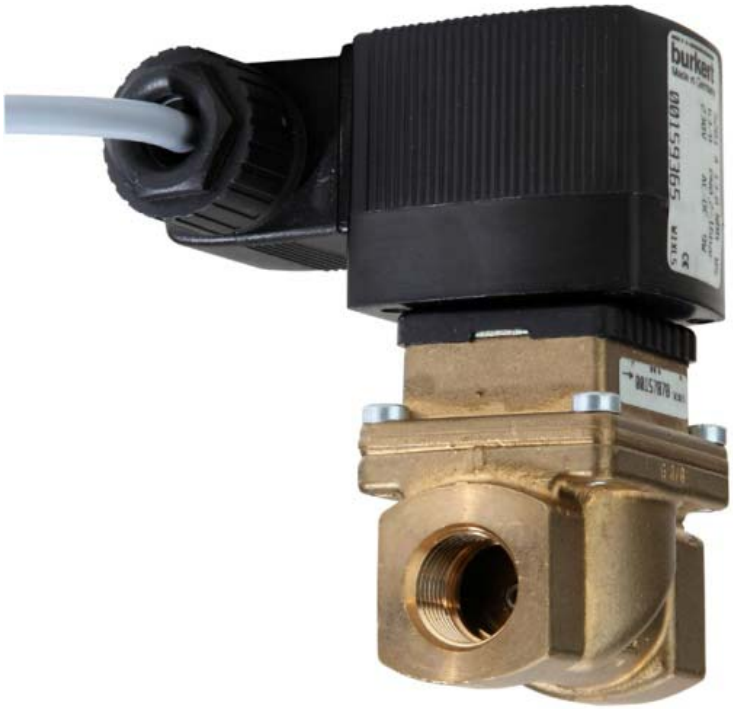
Operating Instructions



Digital Purging Gas Valve
for Ex px operating equipment

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1. Safety

1.1 This manual

This manual contains the information required for using the digital purging gas valve in accordance with its intended purpose. It is addressed to technically qualified personnel.

Familiarity with and the technically perfect implementation of the safety instructions and warnings described in this manual are preconditions for safe installation and commissioning. The safety notes and warnings in this documentation are given in a general way and only qualified personnel will have the necessary specialised know-how to interpret and implement them correctly in specific individual cases.

This manual is an integral part of the scope of supply even if for logistical reasons it can be ordered and delivered separately. If you need any further information, please ask the BARTEC branch that is near you or responsible for your area.

It is essential to read and observe the contents of this documentation and this chapter in particular before you install and operate the digital purging gas valve.

Keep this manual and other documentation relating to the Ex pz operating equipment close to hand at all times.

Particularly important points in this documentation are marked with a warning symbol:

DANGER
Non-observance leads to death or serious physical injury. The necessary safety measures must be taken.

CAUTION
Warning of damage to property and financial and penal disadvantages (e.g. loss of guarantee rights, liability etc.).

ATTENTION
Important instructions and information on preventing disadvantageous behaviour.

NOTE
Important instructions and information on effective, economical and environmentally compatible handling.

1.2 Handling the product

The product described in this manual was tested and left the factory in perfect condition as regards meeting safety requirements. To maintain this state and ensure that this product operates perfectly and safely, it may be used only in the manner described by the manufacturer. Appropriate transportation, suitable storage, and careful operation are also essential for the perfect and safe operation of this product.

The digital purging gas valve must be mounted properly and securely on the Ex p operating equipment if it is to work perfectly and correctly.

1.3 Use in accordance with the intended purpose

1.3.1 Exclusive purpose

The digital purging gas valve serves exclusively as a 2/2-way solenoid valve for inert gas or cleaned, dry instrument air and is intended for utilisation in explosion group II, category 2G and temperature class T4 (Ex II 2G Ex m T4). The electromagnets to control the valves serve to actuate valves which direct the flow of gaseous media.

The digital purging gas valve is actuated by a control unit. For this purpose, the digital purging gas valve is attached to the control unit.

The permissible operational data of the device being used must be complied with.

1.3.2 Improper use

DANGER
Any other use is not in accordance with the intended purpose and can cause damage and accidents. The manufacturer will not be liable for any use beyond that of its exclusive intended purpose.

1.4 Operator’s obligations

The operator undertakes to restrict permission to work on the digital purging gas valve to people who:

- are familiar with the basic regulations on safety and accident prevention and have been instructed in the use of the digital purging gas valve;
- have read and understood the documentation, the chapter on safety and the warnings.

The operator of electrical system in hazardous areas is obligated under IEC 60079-19 and EN 60079-18 to have an electrical engineer check that these electrical systems (which include the digital purging gas valve) are in proper condition.

The owner/managing operator checks that the safety regulations and accident prevention rules valid for the respective application are being observed.

1.5 Safety Instructions

1.5.1 Electrical system

For electrical systems the relevant installation and operating regulations must be complied with (e.g. Directive 1999/92/EC, Directive 94/9/EC, Directive 98/37/EC and the applicable national ordinances, IEC/EN 60 079-0 et seqq and VDE 0100)!

The owner/managing operator of an electrical system in a hazardous (potentially explosive) environment must keep the operating equipment in an orderly condition, operate it correctly, monitor it and do the required maintenance and repairs (BetrSichV [German Ordinance on Industrial Safety and Health] and the applicable national ordinances and EN 60 079-14.)

DANGER
As a fundamental rule, work on live parts, with the exception of intrinsically safe circuits, is prohibited if there is a risk of explosion.

Before making any other connections, connect the protective earthing conductor to the PE terminal.

Make sure that only fuses of the specified type and nominal current strength are used. The use of bridged fuses or shorting jumpers is prohibited.

1.5.2 Installation

Before switching on for the first time, make sure the operating voltage agrees with the mains voltage.

As a basic rule, the adjusting wheel must be unscrewed when the protective gas is connected to the pressure reducer. This prevents pressure surges during commissioning if the pressure reducer was set at too high an outlet pressure.

1.5.3 Operation

If it can be assumed that safe operation is no longer possible, the device must be put out of operation and secured against restarting.

The digital purging gas valve must be completely assembled before it may be operated.

Make sure the controller is switched on before you raise the pressure reducer's outlet pressure to its target level.

Only inert gas or cleaned and dry instrument air may be used as protective gas. In any case a filter must be placed upstream if the right quality with respect to the absence of foreign particles is not assured.

DANGER
Risk of suffocation when using inert gas as a purging gas.
Before opening, stop the supply of purging gas.
When opening, make sure the escaping purging gas cannot be inhaled directly.

1.5.4 Maintenance

NOTE
Regular maintenance is not necessary if the device is operated appropriately in conformance with the installation instructions and with due consideration to the ambient conditions.

Always observe the currently applicable rules and the national regulations for the maintenance, servicing and inspection of the operating equipment!

Operating and maintenance work may be done only by trained and qualified specialists. The statutory rules and other binding directives relating to workplace safety, accident prevention and environmental protection must be observed.

Live parts can become exposed when covers are opened or parts removed (except those that can be opened or removed by hand). Connection parts may be live too.

1.5.5 Assembly/disassembly

The owner / managing operator may do only the necessary wiring work. Any further dismantling may be done only by the manufacturer or persons authorised by the manufacturer. The digital purging gas valve is factory-sealed.

DANGER
Never open the devices. They are factory-sealed and may be opened only in the factory.

The pressurised compartment of the Ex p operating equipment may be opened only if it has first been ensured that the atmosphere is not potentially explosive and there is no connection to voltage.

The digital purging gas valve may not be put into operation until it has been ensured that:

- the atmosphere is not explosive or
- the Ex p operating equipment enclosure is closed completely.

Assembly/disassembly may be done only by authorized qualified personnel. The statutory regulations and other binding directives relating to workplace safety, accident prevention and environmental protection must be observed.

The disposal of this equipment must comply with the national regulations on the disposal of waste.

1.5.6 Repairs

Repairs on explosion-protected operating equipment may be done only by authorised persons working in accordance with the latest developments in technology and using original spare parts. The relevant regulations must be observed. Please direct any questions you may have to BARTEC GmbH.

1.6 Standards conformed to

The digital purging gas valve conforms to Directive 94/9/EC concerning equipment and protective systems intended for use in potentially explosive atmospheres (ATEX Directive). Pursuant to this directive, the following standards serve as a basis for the digital purging gas valve:

Standard	Designation
EN 60079-0:2004	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
EN 60079-7:2003	Explosive atmospheres - Part 7: Equipment protection by increased safety
EN 60079-18:2006	Electrical apparatus for explosive gas atmospheres - Part 18: Construction, test and marking of type of protection encapsulation "m" electrical apparatus
EN 61241-0:2006	Electrical apparatus for use in the presence of combustible dust. Part 0: General requirements
EN 61241-1:2004	Electrical apparatus for use in the presence of combustible dust. - Part 1: Protection by "tD" enclosures

1.7 Ex protection type marking and certification

The following markings showing Ex protection and certification are affixed to the device:

 II 2G EEx m T4

PTB 00 ATEX2129 X

CE

1.8 Warranty

As a basic rule, our “General Conditions of Sale and Delivery” apply. These are available to the owner/managing operator at the latest on formation of a contract. Guarantee and liability claims for personal injury and damage to property are excluded if they are to due to one or more of the following reasons:

- Use of the digital purging gas valve for a purpose other than that for which it is intended.
- Incorrect installation, commissioning, operation and maintenance of the digital purging gas valve.
- Non-compliance with the instructions in the manual with respect to transport, storage, assembly, commissioning, operation and maintenance.
- Structural alterations made to the digital purging gas valve without our prior authorisation.
- Inadequate monitoring of components that are subject to wear.
- Repairs done incorrectly.
- Catastrophes due to the effects of extraneous elements or force majeure.

We guarantee the digital purging gas valve and its accessories for a period of 1 year starting on the date of delivery from the Bad Mergentheim factory. This guarantee covers all parts of the delivery and is restricted to the replacement free of charge or the repair of the defective parts in our Bad Mergentheim factory. As far as possible, the delivery packaging should be kept for this purpose.

In the event of such a claim, the goods must be returned to us after written arrangement. The customer cannot claim to have the repairs done at the site of installation.

DANGER
No modifications or conversions may be made unless the manufacturer gives his approval in writing.

DANGER
Use only original spare parts and original expendable parts. It cannot be guaranteed that parts procured from other suppliers will have been designed and produced in conformance with safety requirements and with the necessary stress tolerance.

NOTE
The manufacturer grants a complete guarantee only and exclusively if the spare parts have been ordered from him.

2. Product Description

The digital purging gas valve is a servo-assisted solenoid valve and its function is to introduce a purging gas into a pressurised piece of operating equipment in Zone 1. An integrated, adjustable leakage air needle compensates for the loss through leakage in the Ex p operating equipment. It is activated by an APEX control unit.

The digital purging gas valve is particularly suitable for neutral media such as inert gases and instrument air.

2.1 Function

The digital purging gas valve does not need operating or differential pressure to function. The valve switches from 0 bar on.

The 2/2-way solenoid valve opens directly by means of the solenoid plunger and is closed by a compression spring. The sealing plug is raised from the seat by the magnetic drive alone.

In the de-energised state the solenoid valve is closed. The special design and geometry of the parts inside the valve allow gentle closing with only very slight pressure peaks. In addition an adjustable bypass, serving to compensate for the leakage in the Ex p area, is integrated in the valve body.

2.2 Picture of the product

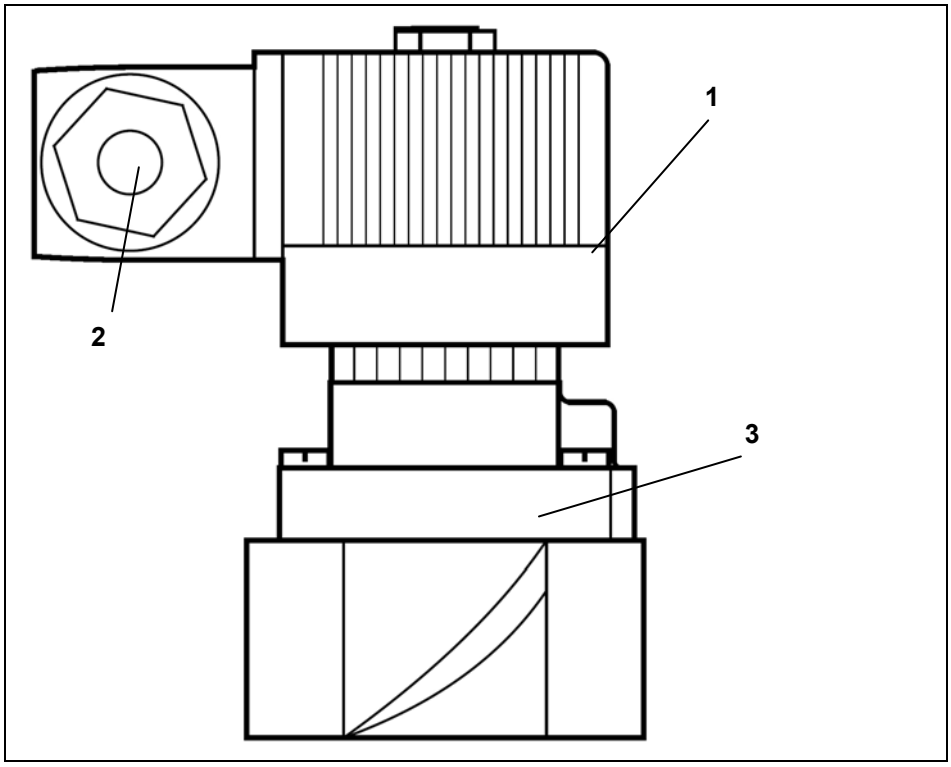
2.3 Variants

Order number	Voltage	Purging air nozzle	Connection
05-0056-0001	AC 230 V, 50 Hz	ø 2.0 mm	3/8“
05-0056-0002		ø 2.8 mm	
05-0056-0003		ø 3.9 mm	
05-0056-0004		ø 5.5 mm	
05-0056-0005		ø 7.7 mm	
05-0056-0006		ø 10.7 mm	
05-0056-0016	AC 110 V, 50 Hz	ø 2.0 mm	3/8“
05-0056-0017		ø 2.8 mm	
05-0056-0018		ø 3.9 mm	
05-0056-0019		ø 5.5 mm	
05-0056-0040		ø 7.7 mm	
05-0056-0020		ø 10.7 mm	
05-0056-0056	AC 230 V, 50 Hz	ø 2.0 mm	1/2“
05-0056-0057		ø 2.8 mm	
05-0056-0058		ø 3.9 mm	
05-0056-0059		ø 5.5 mm	
05-0056-0060		ø 7.7 mm	
05-0056-0061		ø 10.7 mm	
05-0056-0050	AC 110 V, 50 Hz	ø 2.0 mm	1/2“
05-0056-0051		ø 2.8 mm	
05-0056-0052		ø 3.9 mm	
05-0056-0053		ø 5.5 mm	
05-0056-0054		ø 7.7 mm	
05-0056-0055		ø 10.7 mm	

2.4 Selection table for purging air nozzle

Capacity of Ex p operating equip-ment	Size of pres-sure reducer	Orifice plate APEX control unit	Purging air nozzle
less than 50 l	¼”	12 mm	ø 2.8 mm
50 to 150 l	¼”	15 mm	ø 3.9 mm
150 to 300 l	¼” or 3/8”	15 mm	ø 3.9 mm
300 to 700 l	3/8”or ½”	18 mm	ø 4.5 mm
700 to 1000 l	½”	18 mm or 2 x 18 mm	ø 4.5 mm
From 1000 l on	½”	2 x 18 mm	ø 5.5 mm

2.5 Construction of the digital purging gas valve



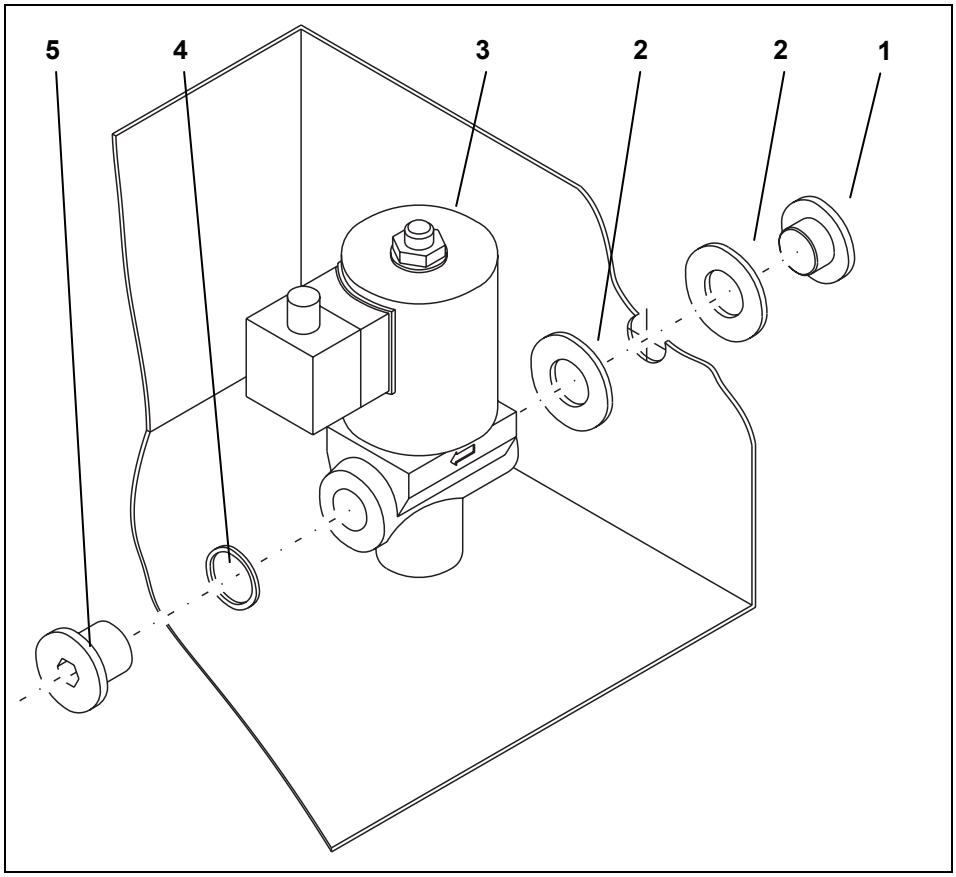
Item	Component
1	Coil body
2	Connection cable entry
3	Valve body with G connecting thread

3. Mounting

3.1 Mounting

a) Decide on the mounting position on the wall of the Ex p operating equipment enclosure.
b) Drill a 17-mm-diameter borehole into the enclosure wall for a G1/4” pressure reducer or a 21- mm-diameter borehole for a G1/2” pressure reducer.
c) Mount the digital purging gas valve in accordance with the following drawing. The mounting parts are included in the scope of supply.

	ATTENTION Pay attention during installation to the digital purging gas valve’s direction of flow. The purging gas must flow into the Ex p operating equipment. The flow direction is specified on the valve body.



Item	Designation
1	Bulkhead union
2	Washers
3	Digital purging gas valve
4	Sealing ring
5	Purging air nozzle

3.2 Electrical connection

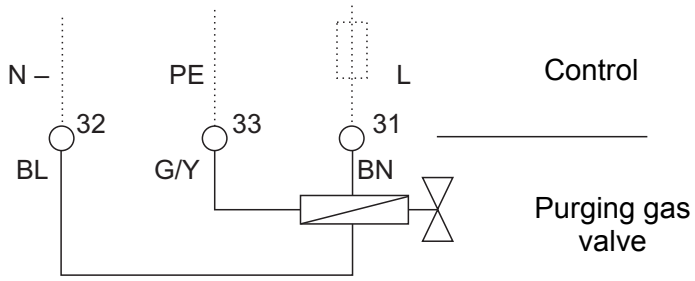
ATTENTION
The digital purging gas valve must always be operated with a fuse.
If the digital purging gas valve is operated in a APEX control unit, the fuse must be installed in the APEX control unit.

CAUTION
The digital purging gas valves may be operated only with a 7W APEX control unit. If the valves are operated on a 15W APEX control unit, there will be no protection against explosions!

The fuse for the purging gas valves is installed in the Ex d control module in the APEX control unit. For this reason it is important to operate the digital purging gas valve with the right type of APEX control unit. Otherwise this can destroy the control module.

NOTE
Only the manufacturer can replace the valve fuse in the APEX control units if it is defective.

Connect the digital purging gas valve as follows:



The cores have distinguishing colours:

Desig-nation	Core colour	Connection
BN	brown	L at terminal 31 in the control
BL	blue	N at terminal 32 in the control
GN/YE	green/ yellow	PE at terminal 33 in the control

4. Commissioning

4.1 Inspections before commissioning

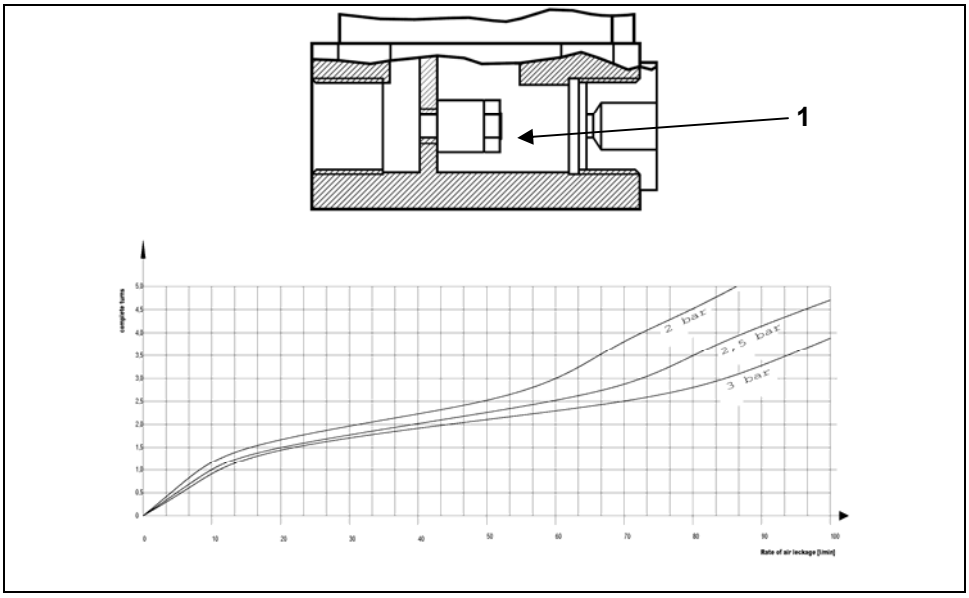
Before putting into operation for the first time, check that:

- the digital purging gas valve has been installed in compliance with regulations,
- the connection has been established properly,
- the digital purging gas valve is not damaged,
- all screw connections have been tightened securely.

4.2 Adjusting the leakage loss rate

a) First close the adjusting screw (1). To do so, use a suitable screwdriver and turn the adjusting screw in the clockwise direction as far as it can go.
b) Refer to the diagram below (or chapter 10) to determine the number of complete turns of the adjusting screw needed for the required quantity of leakage air depending on the operating pressure (2 bar or 3 bar).
c) Use a suitable screwdriver to turn the adjusting screw in an anti-clockwise direction as often as is necessary to set the required quantity of leakage air.

NOTE
After this setting the enclosure's internal pressure should be between 2 mbar and 3 mbar during operation.



4.3 Commissioning

As soon as the control unit is switched on, the digital purging gas valve connected to it starts operation automatically. The digital purging gas valve is not commissioned separately.

5. Operation

After the commissioning and the setting of the air leakage rate the digital purging gas valve is operated automatically by means of the control to which the digital purge valve is attached.

There are no separate controls on the digital purging gas valve.

6. Maintenance and Care

The digital purging gas valve is virtually maintenance-free when operated under the conditions described in these instructions.

Use a damp cloth to clean the outside of the digital purging gas valve when necessary.

	ATTENTION Do not use any aggressive, abrasive or dissolving detergents.

	DANGER Before starting maintenance work on the Ex p operating equipment, make sure the valve is closed and the protective earth connection is connected!

	ATTENTION Valve and pressure reducer are under pressure.

	DANGER Danger of suffocation when using inert gas as a protective gas. Before opening, stop the supply of protective gas. When opening, make sure the escaping protective gas cannot be inhaled directly.

7. Malfunctioning and Troubleshooting

Before looking for the fault, check that the components are mounted and connected correctly (see “Mounting” section).

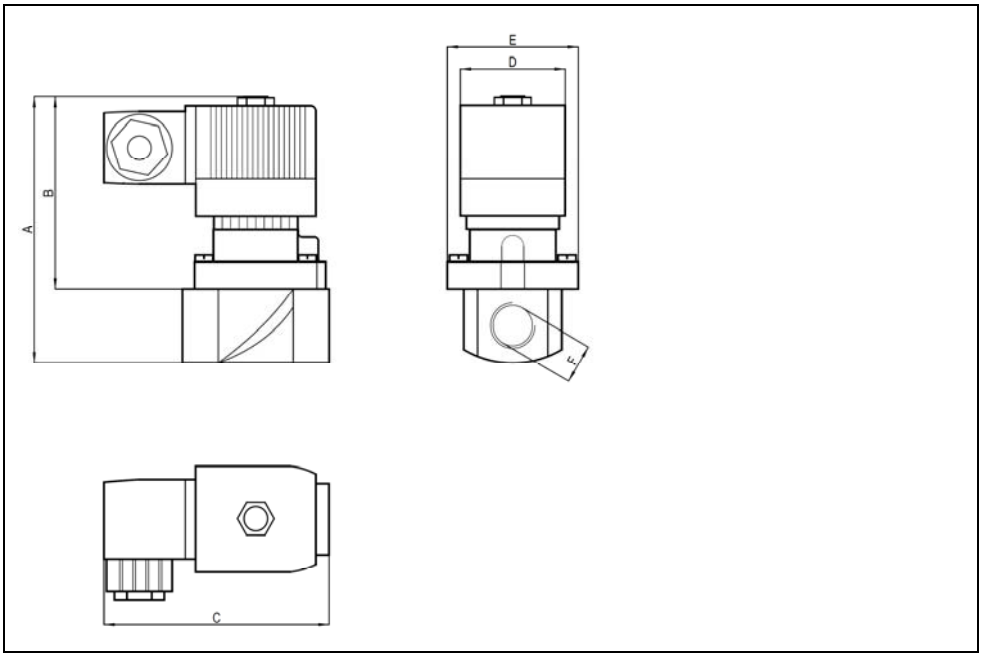
	NOTE The following table with descriptions of faults and information on possible causes presupposes that the components have been mounted and connected correctly.

Fault	Possible cause	Remedy
Digital purging gas valve doesn’t open	no voltage	Check voltage supply, cable connection and fuse
	Short circuit	Find and repair the cause
	Coil defective/interrupted	Replace digital purging gas valve
	Core area dirty	Replace digital purging gas valve
Rate of air leakage is too high	Air leakage rate was set incorrectly	Set air leakage rate again
Rate of air leakage is too low	Ex p operating equipment enclosure is not leak-tight	Check the leak-tightness of the operating equipment and loss through leakage.
	Purging gas pressure is insufficient	Adapt the pressure to the requirements and if necessary increase the conductor’s cross section.
	Insufficient power in the purging gas source	Adapt power to the requirements
	Purging gas piping is contaminated or clogged up.	Check piping and clean if necessary.

8. Technical Data

Parameter	Data
Type	See section 2.3
Design	servo-assisted solenoid valve
Area of use	Ex II 2G
Type of protection	EEx m II T4
Approval	PTB 00 ATEX 2129X
Protection class	IP 65
Nominal diameter	DN 13.0
Installation position	Magnet on top
Pressure range	0 to16 bar
max. flow - at 2 bar	 350 l/min
Enclosure material	Brass
Sealing material	NBR
Flow media	cleaned instrument air (class 543) or inert gas
Temperature of the medium	0 °C to +40 °C
Ambient temperature	-10 °C to +60 °C
Valve connection – 05-0056-0001 to -0040 – 05-0056-0050 to -0061	 G 3/8“ G ½“
Electrical connection	Connection cable 3m
Voltage/power consumption – 05-0056-0001 to -0006 and 05-0056-0056 to -0061 – 05-0056-0016 to -0040 and 05-0056-0050 to -0055	 AC 230 V, 50 Hz, 9.0 VA AC 110 V, 50 Hz, 9.0 VA
Voltage tolerance	± 10% according to VDE 0580
Duty cycle	100% DC
Nominal operation	Continuous operation

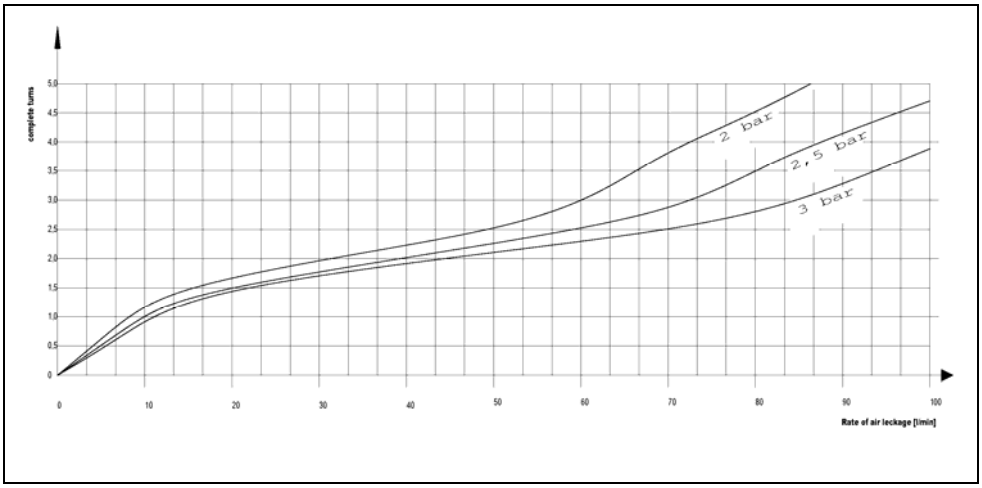
9. Dimensions



Type	A	B	C	D	E	F
Purging gas valve G3/8”	100	72	56	40	40	G3/8
Purging gas valve G1/2”	100	72	65	40	40	G1/2

10. Rate of Air Leakage

The following diagram shows the rate of leakage (l/h) depending on the adjusting screw setting (in complete turns).



11. Declaration of EC Conformity

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EC DECLARATION OF CONFORMITY

We hereby declare that the products with the designation

Coil AC10

satisfy the requirements which are specified in the Council Directives to approximate the laws of the member states:

- **Low Voltage Directive (LVD) (2006/95/EC)**
- **Electromagnetic compatibility (Directive 2004/108/EC)**
- **Pressure Equipment Directive (97/23/EG)**
- **ATEX-Directive (94/9/EC)**

One or several of the following standards were used to assess the products concerning compliance with the **Low Voltage Directive (2006/95/EG)**:

EN 50178	Electronic equipment for use in power installations
EN 60730-1	Automatic electrical controls for household and similar use - Part 1: General requirements
EN 60664-1	IInsulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
EN 60204-1	Safety of machinery – Electrical equipment of machines Part 1: General requirements
EN 60529	Degrees of protection provided by enclosures (IP code).
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use Part 1: General requirements

Additional requirements for solenoid valves:

DIN VDE 0580	Electromagnetic devices and components - General specifications.

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One or several of the following standards were used to assess the products concerning the **Directive on Electromagnetic Compatibility (2004/108/EC):**

EN 61000-3-2	Electromagnetic compatibility (EMC) Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <=16 A per phase and not subject to conditional connection.
EN 61000-6-2	Electromagnetic compatibility (EMC) Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) Part 6-4: Generic standards - Emission standard for industrial environments.

One or several of the following standards have been used to assess the products with respect to **Pressure Equipment Directive (97/23/EG):**

EN 60730-1	Automatic electrical controls for household and similar use Part 1: General requirements
EN 60730-2-8	Automatic electrical controls for household and similar use Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements.

The products have been subjected to the following **conformity assessment procedure:**

Modules A	Internal production control.

The Pressure Equipment Directive for products with a nominal voltage < 50V is applied to the CE mark only for equipment which has a nominal width > 25 mm and controls gases belonging to Group 1 or vapour or controls gases belonging to Group 2 and the product is within the range > 1,500 and < 3,500 for the calculation nominal pressure x nominal width > 1,500 and < 3,500.

The products with a nominal voltage >= 50V with respect to Pressure Equipment Directive (97/23/EC) are assessed in Article 1 Paragraph 3.6 of this directive, according to which the equipment is measured by the Low Voltage Directive and therefore does not drop below the scope of the Pressure Equipment Directive.

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For the assessment of the products according to the **ATEX directive (94/9/EC)** one or several of the following standards were used. The used standards are listed in the EC Type Examination Certificate.

EN 60079-0 (replaced EN 50014)	Electrical apparatus for explosive gas atmospheres Part 0: General requirements
EN 60079-1 (replaced EN 50018)	Electrical apparatus for explosive gas atmospheres Part 1: Flameproof enclosures „d“
EN 60079-7 (replaced EN 50019)	Explosive atmospheres Part 7: Equipment protection by increased safety „e“
EN 60079-11 (replaced EN 50020)	Explosive atmospheres Part 11: Equipment protection by intrinsic safety „i“
EN 60079-15 (replaced EN 50021)	Electrical apparatus for explosive gas atmospheres Part 15: Construction,test and marking of type of protection „n“ electrical apparatus
EN 60079-18 (replaced EN 50028)	Electrical apparatus for explosive gas atmospheres Part 18: Construction, test and marking of type of protection encapsulation „m“ electrical apparatus
EN 61241-0 (partially replaced EN 50281-1-1)	Electrical apparatus for use in the presence of combustible dust Part 0: General requirements
EN 61241-1 (partially replaced EN 50281-1-1)	Electrical apparatus for use in the presence of combustible dust Part 1: Protection by enclosures „tD“.

The following standards were also used to assess **non-electrical equipment and equipment in the filling station area:**

EN 13463-1	Non-electrical equipment for potentially explosive atmospheres Part 1: Basic method and requirements
EN 13617-1	Petrol filling stations Part 1: Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units.

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The production of electrical equipment, for which an EC-type examination certificate is available, is monitored by;

Physikalisch Technischen Bundesanstalt
Bundesallee 100
38116 Braunschweig

Such units are labeled with CE0102.

The EC-type examination certificate comes with the operations manual, where the number can also be found. As a general rule, the standards found in the EC-type examination certificate are valid.

The manufacturer is responsible for this declaration which was prepared on 12. 12. 2007 by the

for 

Undersigned:	**Sonja Drolshagen, Certifications Engineer**
Manufacturer:	**Bürkert Werke GmbH & Co.KG**
Address:	**Christian-Bürkert-Straße 13-17**
City:	**74653 Ingelfingen**

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